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ABSTRACT

This paper presents concepts relevant to, and the benefits to be gained from, using a "systems" model in thinking about academic planning in general and curriculum development in particular. An attempt is made to show how the "systems" approach provides key tools for a diagnosis of academic structure in a college or university. In doing so, the central notion of each model is stated succinctly. Emphasis is placed on the college or university as a system, dimensions of systems analysis, academic planning and systems analysis, participatory planning, study committee, function of the study committee, development of an academic program, determination of objectives, and systems analytical technique. A 13-item bibliography is included. (Author/MJM)

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SYSTEMS ANALYSIS APPROACH TO ACADEMIC PLANNING PART I

BY JOEL O. NWAGBARAOCHA

This is Part I in a series of three articles on Systems Analysis Approach to Academic Planning. Part II of the series will deal with an analysis of degrees offered in relation to jobs available, employment records, and projections for future employment. The basis will be the MIS/TACTICS Fall 1972 reports on degrees offered by 87 colleges. Labor statistics data will be utilized plus some projections and informed insights about the future.

Preamble

In recent years, tremendous demands are being placed upon public and private institutions of higher education to improve the quality of academic programs in instruction and research, and to increase the quality and quantity of services in assisting in the social, cultural, and economic improvements in the urban and rural community. As a result, there are pressing needs for more rational decision making in academic planning. The increased demand for college education (experience), accompanied with the supportive funds from federal and state sources, means that higher education no longer involves the training of an elite but has become a movement for the people. Many more prople are now moving in and out of the college environment as opportunities become available. Consequently, colleges are being attended by large numbers of students having diverse and sometimes distracted interests not necessarily supportive of time-hallowed established goals. This necessitates continuing analysis of curricular offerings, subjects taught, hours of credit in short, continuing analysis of the entire academic process.

To survive, a college or university must be able to adjust rapidly in capitalizing on what may be transient curriculum opportunities. What is needed is a logical analysis of institutional academic structure that emphasizes the systematic application of the elements of efficiency and effectiveness in academic planning.

Mayhew and Ford (1971) suggest that making application of systems or game theory could have considerable relevance for curriculum decisions and curricular structure. They observe that while no college or university has yet sought to apply systems theory to itself or its curriculum, the capability for dealing with complex problems suggest an ultimate use. There are indications that academic planning in the near future will utilize to a great extent the concept of systems analysis approach. Systems analysis furnishes the general philosophical basis for the educational planning technique of an institution.

This paper is not intended to define all the parameters of systems analysis; rather to draw on the basic construct of systems analysis to develop several frameworks for solving problems of academic planning, curriculum development, or curriculum analysis.

The purpose of this paper is to present concepts relevant to, and the benefits to be gained from using a "systems" model in thinking about academic planning in general and curriculum development in particular. An attempt is made to show how the "systems" approach provides key tools for a diagnosis of academic structure in a college or university. In doing so, the central notion of each model is stated succinctly, probably sacrificing some technical elegance and exactness in the process.

College or University as a System

A college or university has complex properties, subsystems, environment, inputs, outputs, and feedback that are similar conceptually to those found in biological organisms, mechanical systems, social systems, etc. In addition, an institution of higher learning is a system of behavioral interaction. It could be viewed as a system comprising interlocking human and non-human resources that are organized to accomplish desired outcomes.

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There are diverse views on an institution of higher learning being a system. Some educators see a college or university as a multisystem since it has subsystems as its entities, viz: administration, faculty, students, etc. Others view it as an open system since it has input and output. In this case, input is perceived as sending students (entities) from the environment into the system, while output is perceived as sending the students (graduates) from the system into the environment. A college is sometimes seen as an adaptive system since there are exchanges between the college and its environment which lead to continuance of the system. In this paper it will be very convenient to simply perceive a college as a system. Realistically, an institution of higher learning could be defined as an "organic" system in which the operational or functional characteristics and the structural configurations are both highly *interdependent* and *related* specifically to the essential functions and tasks which must be performed in carrying out its missions.

If an educational organization (college or university) is viewed as a system, then certainly instruction is its most important subsystem. Historically, those whose primary concern has been the teaching-learning process emphasize that one begins with instruction as the "system." Consequently, the organization and its environment become suprasystems and students and learning materials are regarded as subsystems.

Dimensions of Systems Analysis

Now more than ever before, systems analysis has become quite fashionable as a research technique. In the enterprise of education, persons in varied disciplines are increasingly choosing to regard intricate topics of human concern as systems. Terms like "system analysis," "design," "approach," "accountability," "cost-benefit analysis," etc., are becoming common vocabulary of educators. However, the term "system" is ambiguous and relative. In a general sense, it simply denotes any set of elements and their relations with one another. Systems change their meaning with the point of view, the conceptions and the goals of an observer or a relevant decision maker.

Systems analysis is generally defined as an orderly way of identifying and ordering the differentiated components, relationships, processes, and other properties of anything that may be conceived as an integrative whole. Systems analysis can also be regarded as a technical instrument used in search for objective criteria, social goals, manpower targets, and possible rates of return in educational systems. It is generally defined as the breakdown of any system into its constituent elements or parts such that the relative hierarchy of ideas expressed are made explicit. Such analyses are intended to clarify the system, to indicate how the system is organized, and assist in finding the connections and interactions between elements and parts of a system. It can provide a basis for control of expenditure and accountability and could contain a statement of projected needs that encourages long-range, time-phased planning. It is generally seen as the focus for institutional planning, encompassing goal settings, resources allocation, evaluative review, and revision of objectives.

Under the system analysis process, the ethos of academic planning becomes planning and analysis. This approach is characterized by its relation to some operational guidelines of an institution, and it exposes the naked truth of whether the professed values of a human group, such as in an educational setting, are capable of being transformed into resource allocation. In a broad sense it is a planning procedure for relating curricular objectives to human and material resources. No one sufficient, all inclusive systems theory exists in education, but in relating the available systems research to this context, the academic planner might take an eclectic approach and maximize selected contributions from many sources.

Academic Planning and Systems Analysis

Academic planning involves the formulation of goals, along with the presentation of alternatives, and the forecast of associated outcomes for transformation into actions which influence the behavior of a learner. In other words, an academic planner is concerned with a particular kind of system, broadly defined by specified intentions to deliberately intervene in the behavior of the learner. A systems approach to academic planning explicitly establishes a structure which allows for, and facilitates integration of curriculum offerings drawn from various academic areas toward the achievement of goals.

If the institution is perceived as a system comprising interlocking human and nonhuman resources that are organized to accomplish desired outcomes, then it will be well for academic planners to examine the phenomena of college life with the conceptual frame of reference of systems analysis. The systems approach to academic planning can make a significant contribution to departmental, divisional, as well as a combination of these parts of an institution, as attempt is made to deal with many complex curricular relationships.

It is appropriate to question the basic ideologies of predominantly Black colleges, review their guiding philosophies, and analyze the several assumptions that have been operating. One of the ways to review the assumptions underlying the academic programs of predominantly Black institutions is via the systems analysis approach. The purpose of this kind of analysis is to provide cues and suggestions leading to a system design, system modification, or redesign to suit these institutions. A major aim of the approach proposed here is to create educational settings which are responsive to the changing needs of students and of the society. In planning the academic program for such a setting, it is best to begin by reflecting upon the institution's conception of desirable

directions for the society and then to consider how to create a setting within the institution which would reflect a commitment to move in these directions. The establishment of a peculiarly academic program requires consideration both of internal structure of an institution and the mission and goal of the institution. In the case of developing institutions these two considerations largely overlap. Particularly lacking are techniques for integrating into the academic plan the needs analyses of students, the economic and labor projects of the nation and the community, and elements of the services required to improve a community situation. Any institution attacking these complexities is on a pioneer expedition. Nevertheless, the health of a college depends upon bringing these elements together in a viable manner. A systems approach may be the best way to bring into one model the data needed for adequate academic planning.

Some Basic Questions

In deciding to embark upon comprehensive curriculum planning, the administrators, with emphasis at the president's level, should be willing to expose existing philosophies and operations to open discussion. Each institution in its own unique manner can identify some broad basic questions. Three important broad questions are stated as initial substantive foci for curriculum planning:

> How do students relate their personal life choices to their perceptions of the purposes and values of the broader community and society?

Gaining a better understanding of how young people perceive their place in the world is an important prerequisite to understanding how students will respond to existing educational settings. Such understanding is essential to the creation of new, more appropriate, learning environments. Living in a society in the midst of rapid ideological change, there is great pressure upon young people to consider alternative life styles which incorporate their ideological stance. What kinds of future do young people project for themselves and the society? What are the current conceptions of the "good life" and the "good society?" To what extent do youth see their personal fates linked to that of the larger society? To what extent is the myriadal assumption of general shared values still a valid characterization of American society? What are the core values of different kinds of young people? Who currently accepts economic striving as a central value? What different kinds of values have been adopted by other young people? How do youth perceive other groups within their schools, communities, and the broader society? To what extent are they committed to promoting consensus among groups and how do they handle conflict? To what extent is ideological complexity related to underlying psychological-sociological factors and to what extent is it a function of the idosyncratic life experiences of individuals? Obviously, reliable data cannot be gathered on these questions in a short period, however, answers should be sought in continuing intensive long-term studies of students.

> What kinds of alternative educational forms can be created which will respond productively both to the emerging life styles of Black students and to the needs of the society?

What kinds of educational settings will be responsive to new societal directions? The quality of innovations must be judged within a comprehensive framework which takes a stand on the question of education for what life styles and in what kind of society. Each institution should continually and self-consciously examine its own programs in these terms. But it ought not only look in upon itself, it ought to be concerned also with the development and analysis of other educational environments.

> What constitutes an adequate description of an educational setting?

What is really happening in our colleges/universities? In order to understand the effects of our educational settings, we must be able to identify and describe the significant features of these settings more fully and more accurately. Some people may recognize a broad range of potential determinants of outcomes. For example, an institution may view the structure of its institutional setting and the perceptions and intentions of participants within that setting as important features of a setting itself. How can an institution capture the complexity of the reality within a set of descriptive categories which are analytically manageable? Until we can deal more successfully with this descriptive problem we do not know what indicators of significant affects to look for. (Even before this, ways need to be devised to list the educational outcomes and assess their impacts. In this section, however, the focus is on educational setting.) The number of potential indicators is large; yet, without a detailed description of the setting, we cannot determine whether it reflects implementation of an academic program's original goals. And without comparative procedures for describing different settings, we cannot examine such questions as the extent to which allegedly avant-garde learning environments do in fact differ from traditional settings. These methodological questions should be central concerns of curriculum developers at our institutions.

The three major questions are interrelated and it is expected that there should be substantial interaction among the individuals or groups investigating them. The most obvious links are between the interventionists and the methodologists. The designers of an educational innovation often have a fairly good intuitive sense of whether their project is "working," but they also have much emotional investment in discovering beneficial effects of their treatment. A corps of disinterested observers with a comparative perspective should

go a long way toward "keeping interventionists honest." On the other hand, methodologists have been known to develop complex analytic schemes that are inapplicable to all but the most esoteric of possibilities.

Participatory Planning

There are various ways of involving people in the systems analysis approach to academic planning. Several categories of people should be represented to all levels of academic planning:

- *Students*: the clients served by the institution.
- *Faculty*: the major element of the professional staff of the institution.
- *Administrators*: Deans and vice presidents, admission officers, etc., and non-academic administrators.
- *Directors of institutional research program.*
- *Librarians.*
- *Users*: employers.
- *Community Service Leaders.*
- *Alumni Leaders.*

Figure 1 shows institutional organization for academic planning. The organizational chart does not indicate the number and kinds of persons to be selected as members of each committee. However, the policy of recruiting diverse committee members is a most powerfully determining factor in enhancing the success of a systems approach to academic planning.

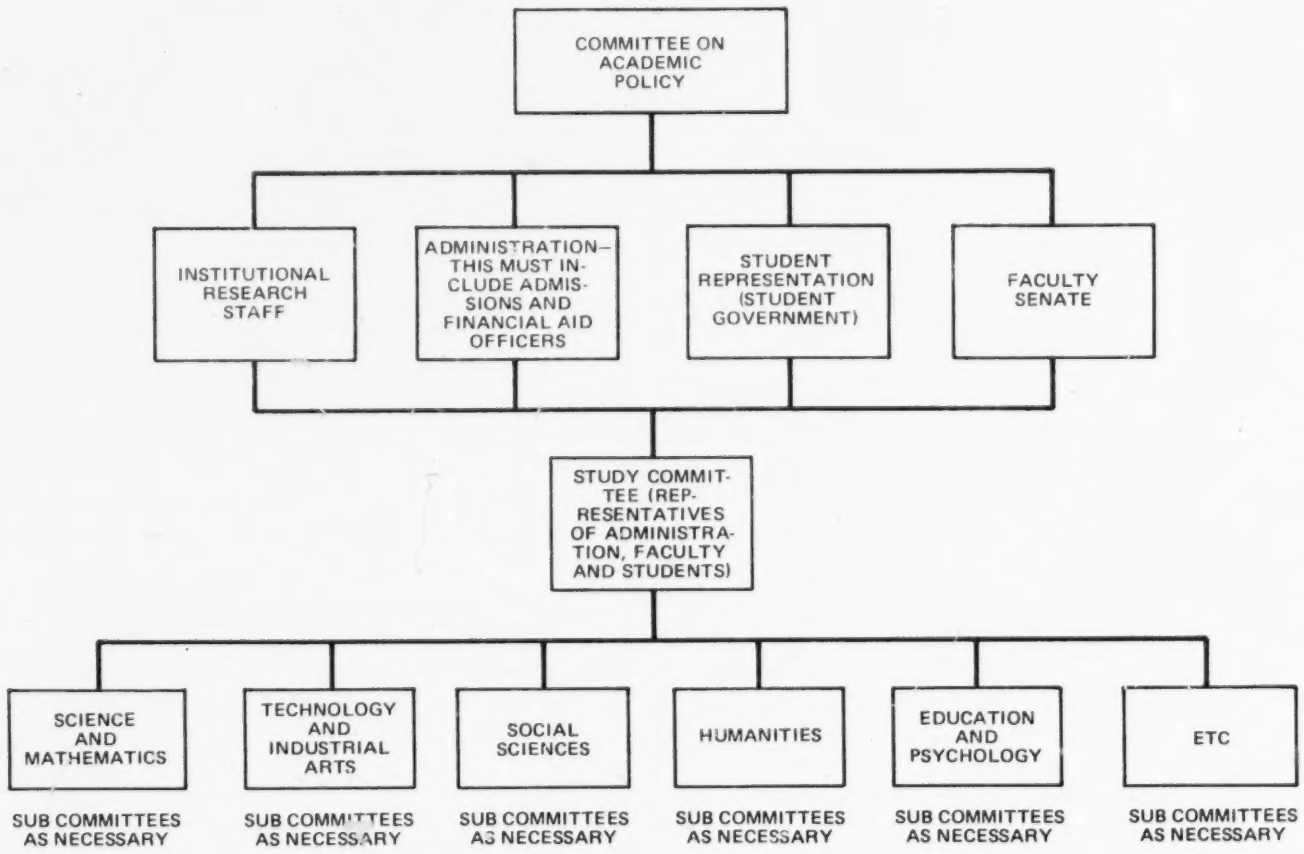

Figure 1. Institutional Organization for Academic Planning

Study Committee

Rather than recruiting individual faculty and/or administrators from as many separate academic areas, the study committee members are recruited in teams of faculty, students, and administrators from the diverse academic areas, departments, and/or divisions. The goal here is to develop a support system as a viable and self-maintaining unit with shared objectives and perspectives—with real potential for leadership in improving curriculum and instruction. The size of each committee will vary according to the academic areas. It is important that the team be large enough to allow diversity in teaching experience and instructional style, as well as to include the varied role representation already mentioned.

The single purpose of formulating the study committee is to energize teams toward active dissemination and implementation of curricular analysis, improvement, or development. It seems clear, then, that every effort should be made to gain the support of the faculty of each academic area or department. The study committee can serve as a catalytic and buffer agency which could provide not only an instiutional technical assistance to academic areas program, but become a communication link between those who determine academic priorities and those who develop curriculum program proposals for each academic area in the institution.

Function of the Study Committee

Each academic program meets to define its goals and objectives and to prepare program objectives and charter of accountability. Since these goals and objectives differ substantially according to the needs of specific academic programs, the criteria of accountability will also differ. This is the important, even crucial, point that constitutes the major advantage of the goal-setting process. It provides the multiplicity of accountability measures that are tailored to the needs and hence the goals of specific academic program.

The "charters" of all academic programs are collated and reviewed by the study committee. Then the combined charters constitute the charter of academic accountability for the entire institution. While there will be some uniformity to this charter, it is apparent that it will resemble more a patchwork quilt than a seamless cloak and will, hopefully, adhere more closely to the reality it attempts to reflect.

A study committee must be formed and organized so as to ensure that the following major functions are effectively carried out:

- Sensing emerging needs in Black colleges/universities.
- Providing for the design of new instructional programs and services.
- Evaluating current institutional programs and services—the ways in which such programs and services are planned and administered, and requirements for redirecting allocations of human and material resources.
- Facilitating the dissemination of information regarding the institution's programs, services, and their effects.

A common factor in all four major functions of the study committee is the critical need for information exchange and processing capabilities. It will be helpful to conceive of this committee as a switching center in a giant, complex information network, much of which it must design and manage. The study committee must be responsive to requests for information and information services for all academic areas representing different programs, interests, and manifesting different concerns, i.e., it must function as a comprehensive and efficient inquiry system. Not only must this committee collect and disseminate basic data and trends regarding Black colleges/universities but it must digest and translate such information into reports for present and future needs of the institution. These reports must be distributed to appropriate potential users, including major academic areas.

This group will be concerned with data from a variety of sources which are collected in a number of ways including among others: data collected by the Institutional Research Office and by non-academic offices, e.g., fiscal management office; regular reports from various academic areas regarding routine monitoring of instructional programs, through meetings and conferences, from reports of workshops and seminars, from academic programs' evaluation studies; and significantly from published literature on new trends, developments, and research results. The committee must synthesize their observations and share them with all concerned.

The committee will sponsor, sometimes conduct or participate in, and publish results of special institutional studies, findings, and services. They will help put the faculty of all academic areas in contact with each other and catalyze the interaction.

This committee should not be viewed or represented as the originator of new knowledge; but instead should be regarded as a collector, compiler, synthesizer, interpreter, disseminator, stimulator, and facilitator of the use of the institution's services.

For an initial project or activities the study committee could conduct a preliminary study of existing curriculum information, undertake developmental instructional activities, and select a pilot project by gathering and reporting the following initial measures for the pilot project:

- Collection of curriculum and instructional information.

- Aggregation, comparison, and other forms of processing.
- Presentation of this pilot information to the faculty senate, the student government, administration, etc., (see Figure I).
- Evaluation of the process.
- Final presentation to the committee on academic policy via the academic dean.

Development of an Academic Program

A flow chart that describes the steps in the development of an academic program is shown in Figure 2. This is presented as an overview for making a careful analysis of all that is involved in a prudential approach either to comprehensive academic planning, or for that matter, to the development of a more narrow, specific, and limited approach.

Figures 3 and 4 give more detailed processes of institutional planning. Models like these may appear to be so directive and inviolate as to "turn off" many persons who may take what they term a more humanistic approach to policy determination. The mood and tone, however, are set by the context of the planning, by the factors that motivate it, and by the nature of the broad supervision and policy-making approach to academic planning. Effective communication processes are vital to the success of planned academic change. Step-by-step guides for carrying out the operations shown in Figures 2, 3, and 4 are not included in this script. These operations are too detailed for this presentation and are better assimilated through workshops, seminars, etc.

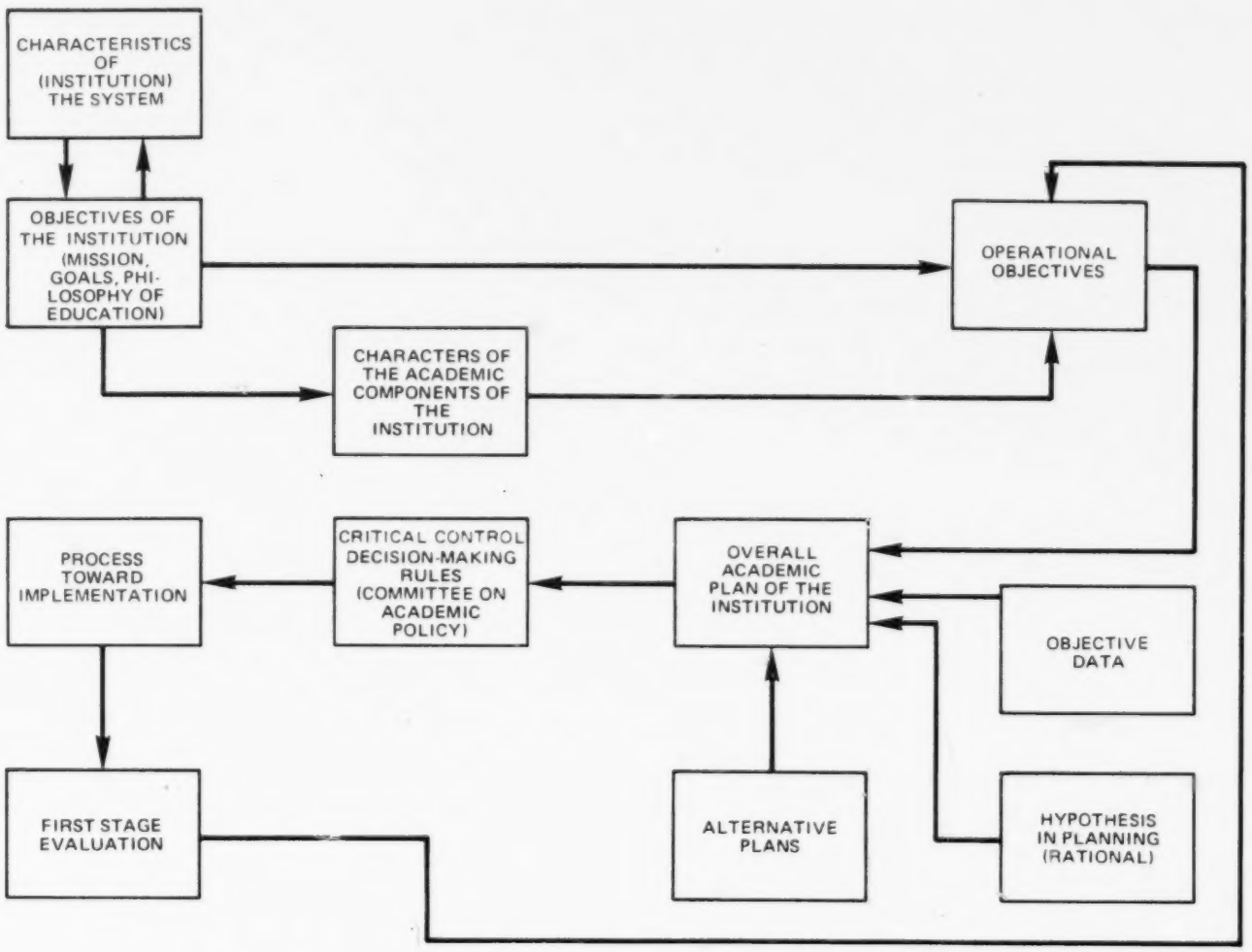
CHARACTERISTICS OF (INSTITUTION) THE SYSTEM
OBJECTIVES OF THE INSTITUTION (MISSION, GOALS, PHILOSOPHY OF EDUCATION)
OPERATIONAL OBJECTIVES
CHARACTERS OF THE ACADEMIC COMPONENTS OF THE INSTITUTION
PROCESS TOWARD IMPLEMENTATION
CRITICAL CONTROL DECISION-MAKING RULES (COMMITTEE ON ACADEMIC POLICY)
OVERALL ACADEMIC PLAN OF THE INSTITUTION
OBJECTIVE DATA
FIRST STAGE EVALUATION
ALTERNATIVE PLANS
HYPOTHESIS IN PLANNING (RATIONAL)

Figure 2. Academic Planning Flowchart

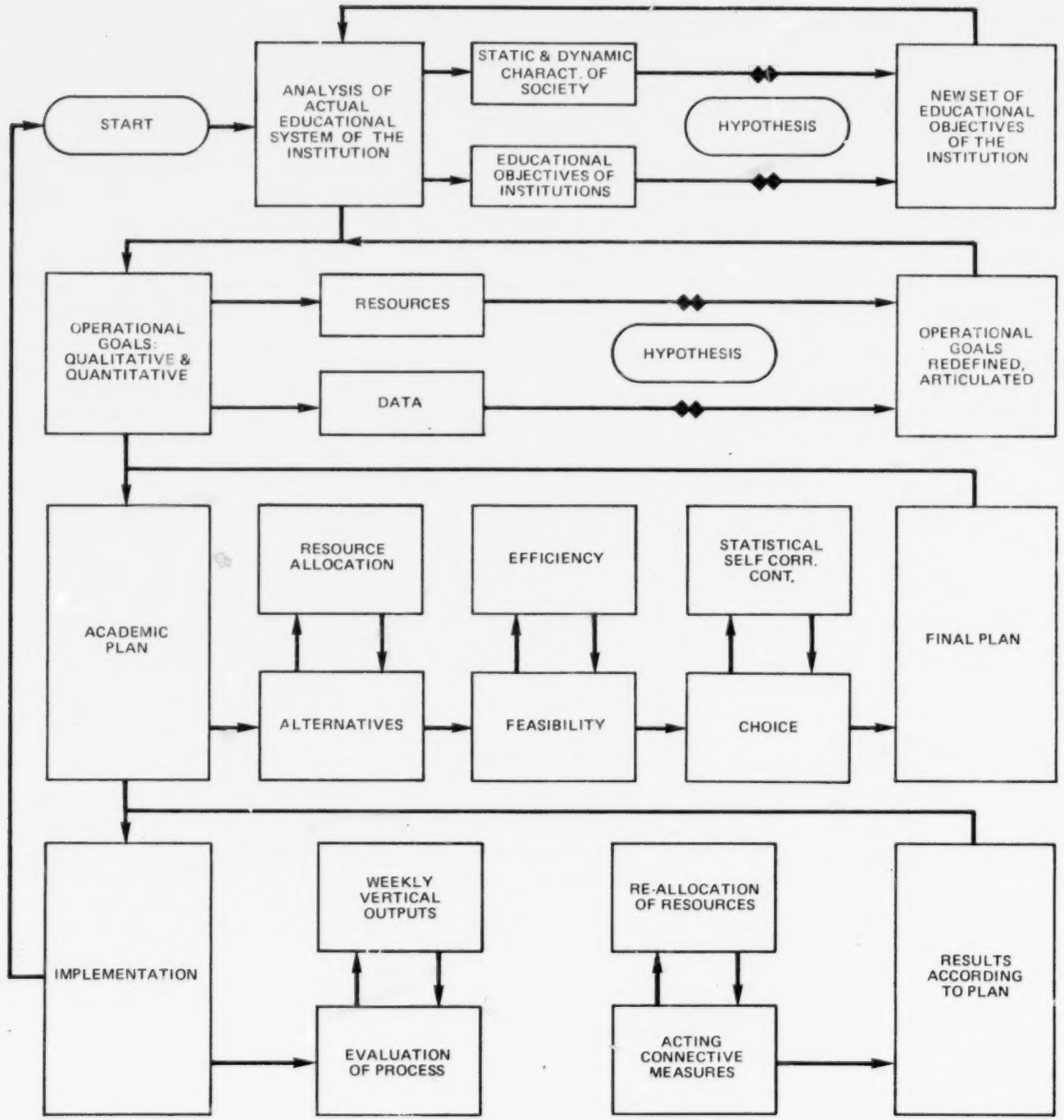

Figure 3. Process of Institutional Curriculum Planning

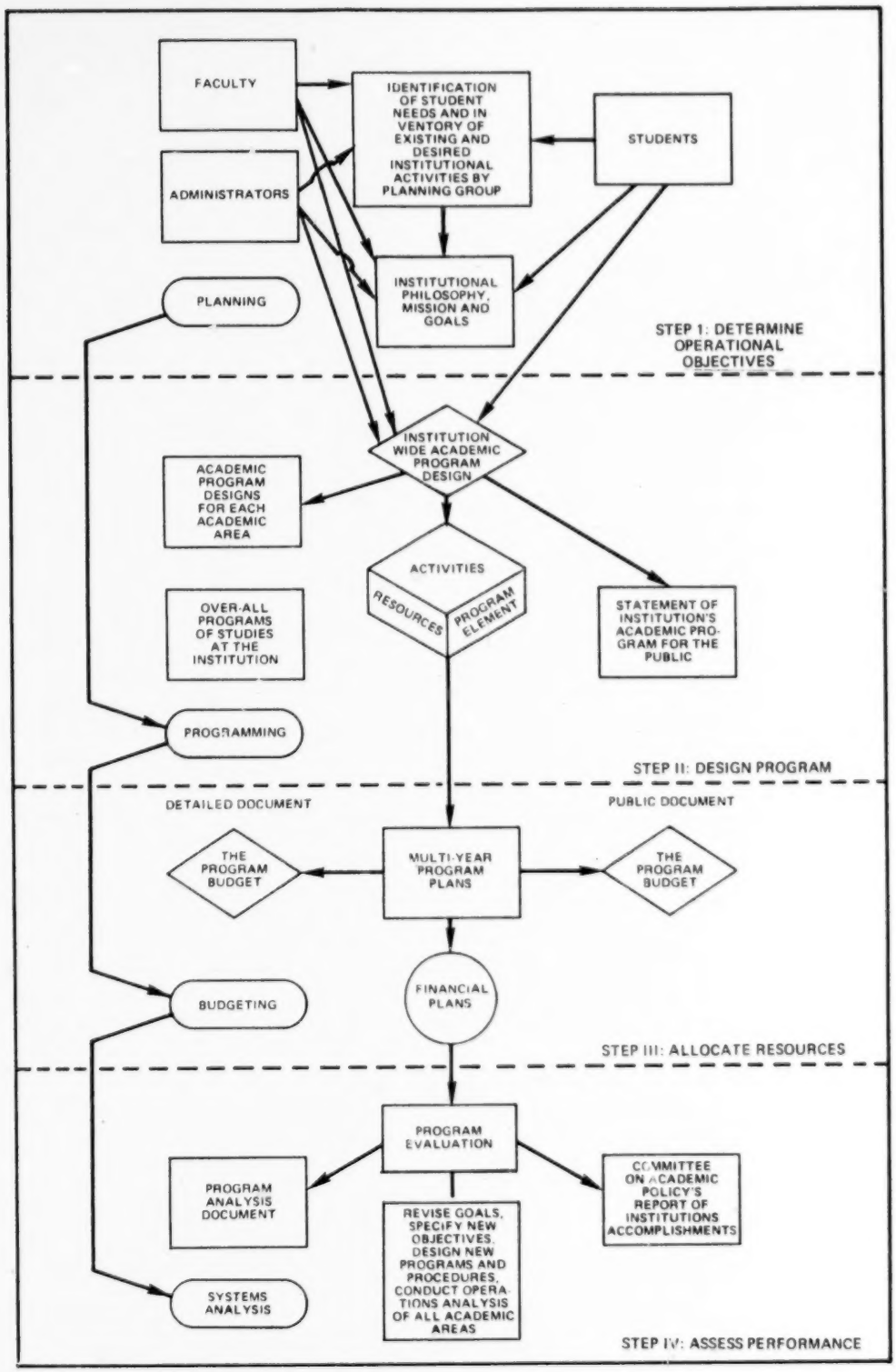
FACULTY
ADMINISTRATORS
IDENTIFICATION OF STUDENT NEEDS AND IN VENTORY OF EXISTING AND DESIRED INSTITUTIONAL ACTIVITIES BY PLANNING GROUP
STUDENTS
INSTITUTIONAL PHILOSOPHY, MISSION AND GOALS
PLANNING
STEP 1: DETERMINE OPERATIONAL OBJECTIVES
INSTITUTION WIDE ACADEMIC PROGRAM DESIGN
ACADEMIC PROGRAM DESIGNS FOR EACH ACADEMIC AREA
ACTIVITIES
RESOURCES
PROGRAM ELEMENT
OVER-ALL PROGRAMS OF STUDIES AT THE INSTITUTION
STATEMENT OF INSTITUTION'S ACADEMIC PROGRAM FOR THE PUBLIC
PROGRAMMING
STEP II: DESIGN PROGRAM
DETAILED DOCUMENT
PUBLIC DOCUMENT
THE PROGRAM BUDGET
MULTI-YEAR PROGRAM PLANS
THE PROGRAM BUDGET
BUDGETING
FINANCIAL PLANS
STEP III: ALLOCATE RESOURCES
PROGRAM EVALUATION
PROGRAM ANALYSIS DOCUMENT
COMMITTEE ON ACADEMIC POLICY'S REPORT OF INSTITUTIONS ACCOMPLISHMENTS
REVISE GOALS, SPECIFY NEW OBJECTIVES, DESIGN NEW PROGRAMS AND PROCEDURES, CONDUCT OPERATIONS ANALYSIS OF ALL ACADEMIC AREAS
SYSTEMS ANALYSIS
STEP IV: ASSESS PERFORMANCE

Figure 4. Flow Chart for Curriculum Planning

[1] The basic structure of this flow chart is taken from "Educational Planning, Programming, Budgeting—A Systems Approach" by Harry J. Hartley. Hartley used this chart to portray ways in which educational philosophy is related to a proposed sequence for integrating the four operations of planning, programming, budgeting, and systems analysis.

Determination of Objectives and Systems Analytical Technique

The basic purpose, or mission of any institution of higher learning is to educate the individual student and to advance knowledge; every effort made, every dollar spent, and each operational plan should lead toward the realization of this mission. A few items to be used as a basis for determining the desired long-range objectives through systems approach are given below:

- The objectives and the learning media to be used for all courses presently taught and those proposed the next 5 years are to be compiled and written in one document to guide the institution in establishing academic programs that will result in the accomplishment of its objectives.
- The purposes of all degrees granted and new degrees proposed for the future are to be established.
- A profile of the students currently enrolled and an indication of the profile of students to attend the institution in future years must be sketched.
- Requirements (if any) for admission to the degree programs must be explicitly stated.
- The time alloted to complete degree programs must also be stated.
- A clearly stated role of the institution in the community must be written and made public.
- The results expected and required of faculty in teaching, training, research, and scholarly publications must be stated in a faculty handbook.
- Each program area must state very explicitly the expected benefits the student may receive after completing a degree program.
- The college community must be aware of educational plans of other public and private institutions with particular emphasis placed on those in the same community. Evidence is needed showing cooperation with neighboring institutions.
- The institution should determine the level of enrollment expected in each year for at least the next 10 years and base the financial plan on this projected enrollment. This plan, of course, must be continuously reviewed and revised.
- The faculty-student ratio should be determined in both the academic and research areas for the total institution and for each academic program area.

A program budget of an institution is organized in terms of the explicitly stated objectives of the institution of higher education, contains alternative ways to achieve the objective, has means for measuring the resources used and the results or output of the operation, facilitates the making of decisions, cuts across departmental lines, and is organized for longer planning periods (5 to 10 years) to provide full cost implications of present decisions. The primary services to be performed may be listed under the existing academic program areas.

In measuring the academic programs quantitatively, a wide variety of analytical techniques are available such as management information systems, operations research, input-output analysis, cost effectiveness analysis, tradeoff analysis, and planning for effective resource allocation. A number of colleges and universities are attempting to systematize their fiscal and curricular planning efforts by means of some of these emerging planning strategies.

> In practically no case should it be assumed that the results of the analysis will make the decision. The really interesting problems are just too difficult and there are too many intangibles (e.g., political, psychological, and sociological) considerations that cannot be taken into account in the analytical process, especially in a quantitative sense. In sum, the analytical process should be directed toward assisting the decision maker in such a way that (hopefully) his intuition and judgment are better than they would be without the result of the analysis.[1]

Conclusion

An aim of the systems approach to academic planning is to create educational settings which are responsive to the emerging needs of students and of the society. A major aim of the systems approach is to help reconstruct institutions of higher learning so that there is a more humane balance between individual and communitarian values. How such reconstruction is to be achieved within an educational context populated by faculty, staff, and students reared in a competitive individualistic culture is a fundamental challenge. An approach which supports collaborative work and pays less attention to individual stardom has to be worked out. Perhaps course contents could be commonly written and taught by groups rather than individuals: perhaps collaborative research and action programs should be considered a normal way of doing an academic project, rather than the exception. This could mean that instead of looking at intellectual stratification, competition, and individual

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[1] David Novick, editor, Program Budgeting; Program Analysis and the Federal Government (Cambridge: Harvard University Press, 1965), p. 67.

achievement as the norm, and egalitarianism, personal openness, and communal support as "deviant," an institution would function in quite the opposite way. An institution could begin with the open primary group as the norm and ask what kinds of social structures would make the individual and the group more secure and productive.

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Dr. Denzel D. Smith of the University Associates Inc., made constructive input in shaping this article. He will co-author parts II and III of the series.

The MIS Research Profile is a periodic reporting service of the TACTICS Management Information Systems Directorate of the Institute for Services to Education, Inc. The purpose of this Research Profile is to make use of the data contained in the MIS Data Bank (containing figures on Black higher education), by researching and reporting on relevant issues of interest to developing institutions. Additional copies of this Profile may be purchased at the rate of $.20 per copy. You may subscribe to this reporting service by contacting:

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